REVIEW AND APPROVALS

BENTON LAKE NATIONAL WILDLIFE REFUGE

Great Falls, Montana

ANNUAL NARRATIVE REPORT

Calendar Year 1985

Robert L Pearson — Refuge Manager
5-21-86 — Date
Brent W. Schwank — Refuge Supervisor Review
5/23/86 — Date

Marvin L Plenert — Regional Office Approval
5/23/86 — Date

INTRODUCTION

Location/Habitat Zone

Western edge of northern Great Plains some 50 miles east of the Rocky Mountains. Twelve miles north of Great Falls, Montana, on the Bootlegger Trail (State 225).

Natural Features

Six thousand acre glacial lake bed with a 240 square mile watershed drained by Lake Creek. The bottom elevation in the lake basin is at 3613 msl with a recent record high water level of 3620.03 in the spring of 1979. Water levels in excess of 3633 msl would flow out of Benton Lake through Black Horse Lake, then on to the southeast some 15 miles to the Missouri River. Grasslands are native short prairie, primarily composed of western wheatgrass and green needlegrass.

Established 1929

President Herbert Hoover set aside 12,235 acres for "use as a refuge and breeding grounds for birds" by Executive Order.

The unit was unmanned until 1961. Natural runoff provided only occasional good year - its potential was proven but good water years were too infrequent. Habitat conditions adequate to support waterfowl production, migrational use and hunting use were undependable.

Development

Local support and political pressure finally resulted in the Fish and Wildlife Service obtaining a major supplemental water source in 1957 - - return irrigation flows in Muddy Creek from the Greenfields Irrigation District - - and the subsequent development of a pumping station and associated delivery systems into Lake Creek to provide water annually to Benton Lake.

The old glacial lake bed was subdivided into six marsh units with dikes and control structures to allow somewhat independent diversion into these units.

The headquarters complex was completed in 1962 and personnel assigned for active management.

Management Practices

In the 1960's management was concerned with stabilizing and protecting the new dikes and water control structures. Grazing intensity was reduced to improve range conditions. Shelterbelt shrub and tree plantings were undertaken. Six hundred acres were broken out of the native grasslands and planted to small grains for supplemental food supplies for the increasing waterfowl numbers.

The natural outlet from Benton Lake where it passes through Rattlesnake Ridge and spreads out onto Black Horse Lake flats before travelling some 15 miles down Blackfeet and Portage Coulees to the Missouri River. Original and recurrent plans call for the development of a gravity drain system out of Benton Lake to the Missouri River.
10/31/85 85-15-4 RLP

In the 1970's the 600 acres of cropland were gradually converted to a permanent nesting cover (DNC) for the ducks. Cattle grazing was terminated to improve nesting cover conditions on the native grasslands. Research studies have proven that substantial wildlife benefits are gained by eliminating grazing from duck production areas. Studies at Benton Lake indicate an annual use of as many as nine duck nests per acre on the DNC units and about a tenth that rate on native grasslands. Botulism, a poisonous toxin producing bacteria, became a serious problem with up to 20,000 birds lost in one year. Water level manipulations and cleanup operations have kept losses to 2000 or less in recent years.

In the 1980's new management thrusts are focusing on increasing emergent cover distribution through the use of a new inter-unit pumping system. The four lower units will be operated at shallower water depths and the accumulating excessive salt load (TDS) will gradually be flushed into Unit IV to try to freshen the water in the other units.

Increasing nesting islands and artificial nesting structures such as round straw bales are being used in combination with a temporary hunting season closure to stimulate local production of Canada geese. Botulism hazards are being further reduced by developing complete drainage capability on each unit by ditching. Water surface acres are being reduced somewhat to help offset the deficit in nesting cover and to help reduce energy costs.

The permanent nation-wide decline in available wildlife habitat necessitates intensive manipulations of both habitat and animal populations in a variety of ways to meet specific goals.

Wildlife Response

Of some 378 bird species known to visit Montana, 194 have been recorded at Benton Lake and new ones are observed each year and added to the bird list. Of the 60 species known to nest at Benton Lake, 12 are ducks. Annual duck production has exceeded 30,000 but averages closer to 20,000. Canada goose production has reached 200 and is increasing. Other migratory birds that reproduce here by the thousands include the Franklin gull, eared grebe and the American coot. The upland game birds of gray partridge and ring-necked pheasant have responded well to the improvements in upland food and cover as have the mourning dove and many other small birds. Use by the burrowing owl, long-billed curlew and McCowan's longspur has declined.

The second goal at Benton Lake is to provide for the needs of birds during the spring and fall migrations as the birds move to summer production areas north of here and to wintering areas to the south and southwest. Peak ducks - 100,000 (April and September); Tundra swan - 6000 (April and November); Canada geese - 2000 (November). Use by the endangered bald eagle and peregrine falcon has also increased in recent years.

Due to the extreme winter climate and lack of topographic diversity at Benton Lake, resident species diversity and numbers is somewhat limited. The marsh is too shallow to sustain a fish population.

We have records of twenty different species of mammals occurring here but only a very few reptiles and amphibians. In the winter the white-tailed jackrabbit and the long-tailed weasel are the mammals most frequently seen. In the summer the Richardson's ground squirrel (gopher) and the muskrat are the most frequently seen. Both species of deer and the pronghorn are seen in low numbers on the refuge.

Benton Lake is now one of the most productive waterfowl refuges in the United States.

Public Use

Public use is limited to day use from March through November of each year. The local school system uses the refuge for well organized environmental education field trips in May studying plants, birds and insect life. A hunting program is conducted on part of the refuge in October and November for waterfowl and limited harvest of upland game birds is allowed. Special regulations and information on the hunt are printed with a map and are available from the refuge.

Most of our visitors enjoy observing or photographing wildlife. There are no facilities on the refuge for picnicking or camping.

The refuge staff also administers the Small Wetlands Program in ten north central counties in Montana. In this program permanent marsh habitat has been acquired with duck stamp dollars. The purchased marsh units are identified with boundary signs as Waterfowl Production Areas. An important part of this program involves the converting of cropland acres into secure permanent nesting cover (DNC). We currently manage 18 units in this program with just over 10,721 acres. All of these units but one are open to trapping and hunting in accordance with state regulations.

Permanent protective easements are also purchased on temporary and seasonal wetlands to protect them from draining, filling and burning of the marsh vegetation.

INTRODUCTION

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B. CLIMATIC CONDITIONS

Nineteen eighty-five was certainly a year of extremes for the Great Falls area - - drought, extreme moisture, unusually hot weather in July, and severe cold weather in October and November.

January and February were very dry with periods of bitterly cold temperatures. March brought normal temperatures and precipitation for that time of year. By the end of the month the refuge water units were 50% ice free.

Precipitation for April was over an inch below normal. Temperatures were slightly above average and all water units were open early in the month.

The drought finally appeared to be broken when over 3 inches of moisture were received the last week in May. Mother Nature was playing tricks on us again as severe drought conditions were experienced through June and July. Temperatures were unusually warm and precipitation was nearly 3 inches below normal. Starting on June 30th there were 13 consecutive days when temperatures exceeded 90°. Four record high temperatures were tied or exceeded, with 101° on July 5th and 6th.

From the first of August through the first 3 days of October rain and very cool temperatures prevailed. August was the coldest and third wettest on record with nearly 5 inches of rain. September brought 3.23 inches of precipitation - some in the form of snow late in the month. Record low temperatures occurred the last two days of the month. October started out very cold with seven inches of snow the second week of the month. The remainder of the month was dry with normal temperatures.

Then came November - - by mid month super cold arctic air hit the area and continued into December. Low temperature records were tied or broken nine different mornings. November, 1985, was the coldest on record, averaging 21.7° below normal. Over 18 inches of snow were received. On December 1st the mercury dropped to -29°. Chinook winds brought rapid warming on the third, but the respite was short lived. Warm windy weather returned at mid month. No precipitation was received after the 13th and the area experienced a brown Christmas.

The weather information on the following table was provided by the National Weather Service at Great Falls International Airport, some 18 miles southwest of the refuge. There are considerable differences in both temperatures and precipitation between these two locations. The refuge usually receives more snow than Great Falls but the annual precipitation is somewhat less.

TABLE 1

WEATHER TABLE - 1985

	GREAT FALLS				REFUGE
	Temperature (F)		Precipitation		Precipitation
	High	Low	Total	Depart	Total
January	49	-28	.35	- .65	.22
February	52	-18	.22	- .53	.39
March	62	- 6	1.02	.09	1.07
April	80	20	.41	-1.08	.11
May	87	28	3.28	.76	2.03
June	94	38	.58	-2.17	.54
July	101	48	.47	- .63	T
August	90	38	4.90	3.59	5.68
September	74	21	3.28	2.20	4.09
October	71	6	1.10	.28	1.13
November	62	-25	1.16	.42	1.32
December	44	-29	.47	- .33	.32
1985	101	-29	17.19	1.95	16.90

D. PLANNING

2. Management Plans

Refuge personnel spent considerable time and effort on plans affecting refuge operations. The refuge Sign Plan was updated and the Annual Water Management Plan was written. The Hunting Plan was closely reviewed for compatibility requirements. A Project Management Plan and Site Specific Agreement was completed with Ducks Unlimited. Assistance was provided for the development of the Kleinschmidt Lake Mitigation Plan. A formal fire agreement was developed with the Black Eagle Volunteer Fire Department and the Cascade County Fire District.

3. Public Participation

Public comment was solicited for the Ducks Unlimited construction project. Comments were used in the formulation of the Environmental Assessment. The Army Corps of Engineers also requested public comment on the issuing of the 404 permit.

Public comment was also requested for the formulation of the Environmental Assessment on the Predator Control Plan at Benton Lake.

4. Compliance with Environmental and Cultural Resource Mandates

The refuge Hunting Plan was reviewed for NEPA compliance and the annual Section 7 review was conducted.

An environmental assessment, FONSI, Section 7 review, archaeological survey, compatibility statement and 404 permit application were completed and approved for the Ducks Unlimited construction project.

A Predator Control Plan, environmental assessment, FONSI and Section 7 review were completed by Assistant Manager Tornow and approved by the Regional Office.

5. Research and Investigations

Benton Lake NR85 - "Daily Survival Rates, Movements and Habitat Use by Mallard Broods on Benton Lake National Wildlife Refuge"
61510-01

In May, Dennis Orthmeyer, a Cooperative Education student from the University of Montana, started a graduate research project on the refuge.

Brood survival, the least understood component of the recruitment equation, combined with increasing salinity levels on the refuge, led to the initiation of this study.

In the first year of the study 16 incubating hens were captured on their nests. The hens were affixed with lightweight radio transmitters and nylon nasal markers. Ten of these 16 hens were successful in hatching. After hatching one hen's radio failed or she left the refuge, three hens experienced total brood loss and six hens fledged broods.

The six fledged brood sizes were:

Hen 809 hatched 9 and fledged 5
Hen 282 hatched 8 and fledged 5
Hen 761 hatched 10 and fledged 2
Hen 988 hatched 9 and fledged 5
Hen 553 hatched 9 and fledged 4
Hen 943 hatched 7 and fledged 6

The causes of these losses are undetermined. Until a radio package for ducklings is proved functional, it will be difficult to ascertain the reason for duckling losses.

Radio monitoring started immediately after radio attachment. Five hundred thirty-four radio triangulations were taken to document brood movement patterns and habitat preference. Seventy-four visual observations of hens and broods were obtained. Visual observations consisted of observing the hen and brood (to the extent possible) in an indisturbed manner and obtaining the number of ducklings in the brood.

The first year of the study was a success. Next year additional information will be collected at each visual observation site. Ten habitat variables will be documented at each site, with emphasis on invertebrate sampling and salinity levels.

Dennis Orthmeyer, Coop Ed student, holding hen No. 272 following the attachment of radio and nasal markers.
05/05/85 85-20-33 DO

College student Nathan Hall doing volunteer work on Dennis Orthmeyer's radio telemetry study of mallard broods on Benton Lake Refuge.
07/85 Personal Photo DO

E. ADMINISTRATION

1. Personnel

PERMANENT PERSONNEL

1. Robert L. Pearson, Refuge Manager - GS-11 - EOD 08/27/77 - PFT
2. Thomas R. Tornow, Assistant Manager - GS-9 - EOD 07/11/82 - PFT
3. Elizabeth A. Benway - Refuge Assistant - GS-5 - EOD 07/22/68 - PFT
4. Vincent J. Marko - Maintenance Worker - WG-8 - EOD 04/30/62 - PFT
5. J. Scott Foster, Maintenance Worker - WG-7 - EOD 06/26/83 - PFT

TEMPORARY PERSONNEL*

1. Kevin M. Lanier, Bio Technician - GS-5 - 04/14 - 10/26/85 - Temporary
2. Dennis L. Orthmeyer, Coop Ed Student - GS-5 - 05/06 - 09/28/85 - Temporary
3. Gregory L. Curry - YCC Enrollee - 06/17 - 08/30/85
4. Dale A. Andersen - YCC Enrollee - 06/17 - 08/16/85

* Pictured elsewhere in report

Dennis Orthmeyer, a graduate student at the University of Montana, was selected to participate in the Fish and Wildlife Service Cooperative Education program at the Masters Degree level. He is studying the daily survival rates, movements and habitat use of mallard broods at Benton Lake Refuge. This is a 30 month program.

Dennis entered on duty May 6th as a GS-5 refuge manager trainee. In addition to his study he assisted with many refuge activities including nesting surveys, banding, environmental education for the YCC enrollees and botulism pickup. He was given orientation in refuge administrative activities and assisted in preparation of monthly reports. He returned to school on September 30th and is expected to start his second year of the study about May first.

Kevin Mark Lanier reported for duty on April 14th as a Bio Aid, GS-4. This was Mark's second season at Benton Lake. On May 26th he was promoted to Bio Tech, GS-5. Mark again assisted with the nest study, banding program, botulism cleanup, output reporting and some maintenance, as well as supervising the YCC crew. Mark's appointment was terminated on October 26th.

In April Scott Foster was presented with his ten year service pin.

Training during the year included:

Pearson, Tornow and Foster attended a law enforcement refresher and participated in firearms qualifications at C. M. Russell Refuge. Benway attended an administrative training workshop in Billings.

All permanent employees, along with their spouses, attended a Pre-Retirement Seminar, either in Billings or Bismarck, ND, and took an eight hour CPR course offered by the American Red Cross.

Meetings attended included:

Pearson participated in the Montana waterfowl/wildlife tour of the Centennial Valley and attended an annual work planning meeting at Seedskadee NWR; Tornow attended several meetings connected with the Kleinschmidt Lake mitigation project; Pearson and Tornow attended a project leaders meeting in Missoula and met with Montana Department of Fish, Wildlife and Parks personnel to discuss water and waterfowl management issues and toured their facility at Freezeout Lake; Pearson, Tornow and Orthmeyer attended the Mallard Symposium at Bismarck, ND.

TABLE II

PERSONNEL

Fiscal Year	Full Time	Temporary	YCC	FTE
1985	5	2	2	5.9*
1984	5	2	2	5
1983	5	2	2	5
1982	4	2	1	4
1981	4	4		4

*Does not include YCC

2. Youth Programs

Benton Lake had two YCC enrollees again this year. Greg Curry, a student at Great Falls High School, and Dale Andersen, a student at C. M. Russell High School, reported for duty on June 17th.

Their duties included assisting with nest surveys, banding, botulism cleanup, vehicle cleanup, litter pickup, grounds and buildings maintenance, fence removal and numerous small projects.

One of their major accomplishments was to assemble a map showing the recovery locations of all ducks banded at Benton Lake. Ducks banded at Benton Lake have been recovered from Alaska to southern Mexico and from California to Quebec and South Carolina, and many points in between.

Dale was terminated on August 16th and Greg on August 30th.

4. Volunteer Programs

Four members of the Upper Missouri Breaks Audubon Club volunteered their time to set up and arrange the refuge's reference library. This was a project long overdue.

Nate Hall, a wildlife student from the University of Montana, worked as a volunteer from July 16th through July 26th assisting Dennis Orthmeyer in radio tracking mallard hens and in botulism monitoring.

Mark Lanier's bride, Tina, assisted with duck banding on weekends. Visiting friends of Dennis Orthmeyer also donated their time to assist with the banding program while visiting the refuge.

Duck banding was one of the favorite projects that volunteers participated in this year. Friends of Dennis Orthmeyer shown here releasing banded mallards.

08/05 Personal Photo DO

5. Funding

Fiscal year 1985 program costs were kept within the budgeted allotment. Other than salaries, the largest single item in Benton Lake's budget is the cost of pumping water from our pumping station near Power, Montana, to the refuge. Most of our pumping is accomplished in July, August and September which requires that we program about one-third of our annual budget for the final quarter of the fiscal year. This year 19.6% of our O and M budget of $195,000 went for electrical pumping costs.

In addition to the $195,000 O and M funds, we had $15,000 for small ARMM projects, $75,000 for the large ARMM project (storage building) and $40,000 for Threats and Conflicts. No funds were provided for YCC again so $3,000 was taken from our initial $198,000 O and M budget.

Table III provides a funding summary for the past five years.

6. Safety

Nine formal safety meetings were held this year.

Safety activities during 1985:

- Nine safety films were ordered and viewed.
- All refuge personnel received CPR training.
- Wood burning stove chimneys were inspected and cleaned monthly during the winter months.
- New high output fluorescent lights were installed in the shop to improve lighting.
- YCC Form 4's and hazard analysis sheets were developed.
- Bio Tech, coop student, and 2 YCC given safety orientation.
- The headquarters cistern and pressure tank were replaced with new units.
- SAFE, Inc. under GSA contract, serviced the fire extinguishers.
- Fire extinguishers were checked monthly along with smoke detectors in the two residences.
- Refuge personnel received fire pumper operation training.
- Safety vehicle barriers with reflectors were installed on the Unit I and II outlet structures.
- A fire fitness step test was given for refuge personnel.
- Furnace systems were serviced prior to cold weather.
- A formal fire agreement was developed with the Black Eagle Volunteer Fire Department.

Three accidents occurred on the refuge this year. In July YCC enrollee Dale Andersen was bitten by a rattlesnake while he was watering trees around the headquarters shelterbelt. Dale reached down to pick up the water hose to move it to another tree when the snake struck without rattling. Dale was taken to the hospital for treatment. A small amount of anti-venom was administered and he was sent home after a couple of hours of careful monitoring.

In August Maintenanceman Scott Foster slipped and bruised his knee. He was trying to climb up into the dump truck to clean the box during muddy

TABLE III

FUNDING SUMMARY

FY	1260	1210*	1220	1240**	3100	Rehab	BLHP	Quarters Maintenance	YCC	TOTAL
85	325,000[1]							3,000	3,000	331,000
84	275,000[2]					59,000[3]		3,100	3,000	337,100
83		185,000	12,000	10,000		60,000[4]		1,700	3,000	271,700
82		173,000	8,000	5,000				2,000	1,500	189,500
81		178,000		4,000	5,000[5]		89,000	4,000		280,000

* Includes 1200 and 1220 funds prior to FY 82
** Includes 1500 funds

1 Includes ARRMS funds of $90,000 & Threats & Conflicts funds of $40,000
2 Includes ARRMS funds of $70,000
3 Engineering job order carryover from FY 83
4 Engineering job order carryover into FY 84
5 Final year of 3110 funds

conditions. The injured knee did not heal and in December his knee required surgery for frayed ligaments.

In December Maintenanceman Vince Marko accidentally damaged a bundle of galvalume siding for the new storage building during snow removal operations. The refuge replaced the damged bundle.

Roof sheeting going on. Windows and walk in door are in place. One bundle of sheeting, left on the ground, got damaged following a heavy snow storm when snow removal operations began.
12/13/85 Personal Photo TT

7. Technical Assistance

The Upper Missouri Breaks Audubon Club was given assistance in the Christmas Bird Count in the Great Falls area. Manager Pearson acted as compiler for this event.

Tornow corresponded with the Marias River Weed Action Committee. The committee was proposing to assess a charge by land ownership for weed spraying. The refuge has wetland easements but no fee title within the Marias River drainage. We supported their proposal but declined to offer any financial assistance.

Eldon McLaury, Wisconsin WMD manager, requested information on our nest study design and DNC plantings.

The Western Bird Banding Association was provided with the results of the refuge's waterfowl banding program.

Manager Pearson and Coop Student Orthmeyer gave a program on wildlife, refuge management, and resource techniques to 230 Cub Scouts and leaders.

Pearson and Tornow toured Freezeout Lake Waterfowl Management Area with Manager Frank Feist. Frank requested information and ideas on water level management at Freezeout Lake.

An environmental assessment on a local landfill project was reviewed and a written response submitted to the Montana Department of Health and Environmental Sciences.

F. HABITAT CONDITIONS

2. Wetlands

Weather conditions in early 1985 are characterized as being cold and dry with little snow cover. Spring thaw began with ice going out of the Missouri River on March 14 - 15. The meager snow melt and runoff (650 acre feet) were over by March 25. Strong chinook winds took the remaining ice off lakes and marshes by April 4. The usual rainy season in May and June didn't occur until August and September. Soil moisture then built up and some local runoff occurred in September and October (421 acre feet). A cold, moist early fall proceeded with marsh units briefly freezing over on October 6th. Below zero temperatures the first week of November sealed all the marshes, and most of the local rivers soon froze over, sending most migratory birds south earlier than usual.

Water habitat conditions went from fair to poor with little spring runoff and continued drought conditions. Our water habitat declined from 3200 to 1800 surface acres by late July.

Delivery of water from the Muddy Creek pumping station was delayed first by our contractor who was behind schedule on structure replacement in Lake Creek. Pumping began on May 27th but then inadequate supplies in Muddy Creek shut down one of our pumps until late July. Repairs on the new structure (#29) in Lake Creek, replacement of a pipeline gate valve and pumphouse roof repairs also shut down all pumping operations for a few days in June and July. The No. 3 pump had to be sent back to Salt Lake City for a redo on the 1984 overhaul job.

Finally in August there was adequate water supply and we were able to operate all three pumps, bringing water back up to target levels in the units. We then were able to reflood Unit V and store extra water in Units I and II so that the unit to be built by Ducks Unlimited could be flooded early in the spring instead of having to rely on spring runoff or to wait for mid summer pumping. With the unusually wet August and September combined with all three pumps in operation, we ended the year with a little more water in Units III, V and VI than planned and a net gain of 2094 acre feet for the year. A more detailed review can be found in the "1985 Water Management Use Report" in station files.

Wetland habitat improvement work this year included a YCC project on three of the recently built islands in Unit VI. Buck brush and wild rose were transplanted onto these islands; tall wheatgrass and yellow sweet clover seed were hand broadcast onto the intervening areas then mulched with straw and irrigated a couple of times. We want to get a good nesting cover established on these islands which will also reduce use by California gulls. See Section I-1 for other wetland habitat improvements.

After the shrubs were transplanted, a grass and legume mixture was hand broadcast onto the islands followed by straw mulching. YCCer Dale Andersen shaking out straw!
08/02/85 Personal Photo DO

YCC supervisor Mark Lanier uses a lower angle technique to shake out the straw - - experience does help.
08/02/85 Personal Photo DO

Buck brush (snowberry) and wild rose were transplanted onto three of the eight nesting islands in Unit VI by our YCC crew. Now if the wind doesn't blow it all away - and - and
08/02/85 Personal Photo D 0

3. Forests

Shelterbelt plantings also noticeably suffered from the drought this summer with mid summer fall colors and many of the shrubs losing the majority of their leaves. Irrigation of the headquaters shelterbelt evergreens helped sustain them with no losses.

5. Grasslands

The refuge contains 5773 acres of short grass-prairie grasslands dominated by western wheatgrass and green needlegrass. Cattle grazing was terminated in 1976 and the range is in good to excellent condition as per SCS standards. Continued severe drought caused the range to remain dormant until the above normal rainfall in August allowed some vegetative growth but few seed heads if any were formed. The moisture in May allowed the crested wheatgrass and some of the cheatgrass to briefly show a little green but the range was brown most of the summer. Extreme fire danger caused the counties to ban all open burning.

Grasslands on Benton Lake have three identified problems: 1) Following facility development in the early 1960's crested wheatgrass was planted on abandoned field trails and on the raw slopes and borrow areas along the dike and road system. There has been a slight degree of expansion of the tame grass into the native grasslands. 2) Historic overgrazing coupled with soil structure conditions has left a few areas with near solid stands of club moss and blue gramma. 3) Excess salt water forced to or near

the surface due to soil structure and adjacent land use practices (fallow cropping) generate an adverse condition known as "saline seep'. The government's effort to modify local land use practices near the refuge has met with no success.

9. Fire Management

A lightening strike ignited grass in DNC field No. 7 about 10:00 PM on June 30, 1985. Assistant Manager Tornow spotted the fire when returning from town. He and ARM Dennis Orthmeyer were able to put it out with the refuge pumper without futher assistance. Volunteer Barb Tornow operated the telephone and radio system in case more help was needed. (Thanks, Barb).

A lightening strike ignited residual cover in DNC Unit 7 on June 30, 1985. About three acres burned.
09/85 85-20-30 DO

A control burn of several hundred acres of foxtail barley was planned on the Unit V basin. The perimeter canal was flooded to act as a firebreak. Then over five inches of rainfall was received in August. Only about 5% of the area could be burned prior to reflooding the entire basin.

An attempt to burn off the dry basin vegetation, primarily foxtail barley, prior to reflooding Unit V met with little success due to wet weather conditions.
08/30/85 Personal Photo DO

10. Pest Control

Annual noxious weed control efforts using a mixture of Weedar 64 have been applied to the Lake Creek right-of-way and to the ditch areas near the Kloppel and Purdum Coulee control structures as in the past, primarily for the suppression of seed production of Canadian thistle. Whitetop was spot treated early, was then given a second treatment while working on the Canadian thistle in late May.

In lieu of allowing the Cascade County Pest Control office to control "weeds" along the Bootlegger Trail where it passes through the refuge, we continue to undertake necessary minimum control measures on Canadian thistle within and along this right-of-way.

The spotted knapweed was more of a problem this year. We not only found it spread over extensive areas of the 147 acre Muddy Creek tract where our pumping station is, but also found it invading the road edges along the Bootlegger Trail. This species has invaded and now dominates massive areas of pasture and rangeland in western Montana. Last year was the first year it was noticed to any extent at the Muddy Creek site and the Teton County Weed Control crew treated the roadsides and part of our tract. This year the refuge crew tried to spray all of it they could find and made a followup treatment about three weeks later. We will now need to keep a sharp eye out for it in the refuge as not only is it coming in via motor vehicles along roads - we may be pumping it in with our water supplies.

Although grasshoppers were an extensive problem in most of the west this year, no control was done on the refuge.

11. Water Rights

Drought conditions, a shortage of stored water in Gibson Reservoir, and improved management efficiency and distribution in the Greenfields Irrigation District combined to limit the water supply at our pumping station at Muddy Creek. Only one pump could be operated from mid June to late July due to a shortage of water. All three pumps were operated from mid August to mid September allowing us to refill Unit V.

Unit V following reflooding this fall. A perimeter and an interior canal were excavated - spoil was used to develop 66 loafing islands near the canals. Peninsula cutoff islands were formed in the lower left bay. A four acre circle dike excludes water in a portion of the upper end of the unit - simulating an island.
10/31/85 85-14-21 RLP

G. WILDLIFE

1. Wildlife Diversity

The published refuge bird list contains 175 bird species. Since its revision in 1981, twenty additional species have been seen on the refuge; gyrfalcon, Richardson's merlin, short-billed dowitcher, wood duck, osprey, orange-crowned warbler, catbird, northern oriole, Lapland longspur, red crossbill, purple sandpiper, cedar waxwing, veery, American redstart, piping plover, saw-whet owl, rusty blackbird; and the 1985 additions which include the green heron, dipper and black duck.

The most unusual addition to the refuge bird list this year was the very accommodating Little Green Heron which remained on the refuge for about 2 weeks and is thought to be only the fourth sighting in the state.

05/22/85 85-8-10 BB

2. Endangered and Threatened Species

The bald eagle and peregrine falcon are the two endangered species that are frequently seen on the refuge during the spring and fall. Sixteen bald eagle sightings were recorded this year with a peak population of 4 on November 12th. Six peregrine falcon sightings were recorded in the spring. No observations of peregrine falcons were made during the fall migration.

Threatened species occurring on the refuge this year were the prairie falcon, ferruginous hawk, western burrowing owl, Richardson's merlin and the white-faced ibis.

The ferruginous hawk and the western burrowing owl have been documented as nesting on the refuge in past years and production was suspected this year.

Raptor observation cards are submitted to the Montana Bald Eagle Working Group. Data is collected on all bald eagle and peregrine falcon sightings.

3. Waterfowl

Swan

Tundra swan were first seen on March 17th. A record peak population of 6000 tundra swan was observed on April 4th. By April 17th the majority of the swans had departed for their northern breeding grounds. A blue neck collared tundra swan was first observed March 28th. The collar number (A496) was reported to Rod King in Alaska and his records showed it was banded as an adult in 1980 on the Seward Penninsula. The collared swan was last seen on April 10th.

Fall use began October 24th with a peak of 800 on November 2nd. The fall peak population is considerably lower than previous years due primarily to low water conditions and unstable fall weather. Table IV shows a comparison of peak populations and use days on an annual basis.

White Geese

Snow geese were first observed on March 17th and a peak of 2500 was seen on the 4th of April. The fall migration was highlighted by the peak population of 37,000 snow geese on November 6th.

Small numbers of Ross' geese were seen migrating with the snow geese during the spring and a record peak of 3000 was observed on November 6th.

The number of recorded use days (329,455) for snow geese was the third highest on record. A record 27,362 use days for Ross' geese was recorded. Due to drought conditions, adjacent farmers did not attempt to harvest their poor yielding small grains providing abundant feed for migrating waterfowl. Table V compares previous years of waterfowl use days.

Canada Geese

The first Canada geese began inspecting the refuge on March 18th and peaked at 170 on March 29. The first brood was seen on May 7th. Canada goose nest success appeared to be a record low of 8% compared to above 90% nest success the previous 3 years. Low water levels, and probably our increasing raccoon population, allowed predators easy access to goose nests. Production was estimated at 32 which is a sharp decline compared to the inclining production estimates from previous

TABLE IV

BENTON LAKE WILDLIFE REFUGE

TOTAL SWAN USE DAYS - OBJECTIVE: 300,000

YEAR	PEAK POPULATION SPRING	PEAK POPULATION FALL	SPRING USE DAYS	FALL USE DAYS	TOTAL USE DAYS
1962	0	40	0	875	875
1963	150	0	1,442	0	1,442
1964	30	0	210	0	210
1965	90	60	1,155	1,470	2,625
1966	495	151	3,507	1,544	5,061
1967	62	120	497	1,113	1,610
1968	285	740	1,260	3,101	4,361
1969	50	90	805	1,386	2,191
1970	470	667	10,845	5,656	16,501
1971	550	200	6,804	2,338	9,142
1972	1,800	225	12,851	5,740	18,591
1973	600	1,000	16,650	6,900	23,550
1974	160	160	4,200	6,930	11,130
1975	160	110	1,200	6,400	7,600
1976	704	550	12,150	6,510	18,660
1977	1,580	1,150	28,212	33,020	61,232
1978	250	350	2,400	3,900	6,300
1979	130	750	920	24,000	24,920
1980	3,500	2,500	41,310	33,100	74,410
1981	4,100	2,000	45,500	15,200	60,700
1982	1,000	2,500	9,084	34,750	43,834
1983	4,500	2,500	120,612	52,359	172,971
1984	1,500	3,200	53,950	39,950	93,343
1985	6,000	800	46,030	5,275	51,335

TABLE V

WATERFOWL AND COOT USE DAY HISTORY

YEAR	SNOW	ROSS	CANADA	DUCKS	COOTS
1965	2,569	0	6,450	5,328,470	432,285
1966	16,800	0	3,640	3,194,380	774,375
1967	16,177	14	6,090	6,325,403	2,826,040
1968	70,532	210	8,036	10,883,810	6,010,480
1969	18,130	0	11,011	6,870,710	2,810,710
1970	475,482	0	10,185	6,950,909	1,877,204
1971	78,099	0	16,401	5,955,257	1,702,393
1972	22,650	0	49,800	6,649,974	2,633,537
1973	27,230	0	38,370	7,976,175	2,333,110
1974	17,623	0	33,781	5,006,538	1,110,080
1975	17,340	0	30,510	4,396,694	1,487,620
1976	23,310	0	39,790	7,699,322	2,461,595
1977	78,531	9,755	22,862	6,199,702	1,729,750
1978	13,750	1,561	13,965	9,001,889	2,751,310
1979	31,562	30	20,890	5,778,157	1,704,741
1980	69,975	122	40,048	6,306,845	2,014,320
1981	138,100	970	70,440	6,970,066	2,381,334
1982	377,493	4,012	68,794	8,007,353	1,452,000
1983	239,335	4,760	82,955	10,474,817	753,960
1984	13,091	486	94,464	4,280,274	926,200
1985	329,455	27,362	94,893	5,113,861	1,288,393

years (Table VI).

TABLE VI

PRODUCTION BY YEAR

YEAR	CANADA GOOSE Objective: 500	DUCK Objective: 20,000	COOT
1962	0	412	10
1963	0	2,275	600
1964	0	1,315	750
1965	0	1,312	470
1966	0	4,352	1,470
1967	5	9,250	11,400
1968	11	28,158	29,750
1969	11	17,145	10,720
1970	9	39,253	8,485
1971	35	22,000	7,000
1972	40	13,600	1,000
1973	40	10,789	3,000
1974	29	9,890	200
1975	6	3,990	200
1976	43	21,750	3,000
1977	52	10,556	3,000
1978	25	7,930	2,000
1979	60	11,520	4,000
1980	48	31,350	4,000
1981	70	21,780	4,000
1982	100	18,092	5,000
1983	160	28,894	1,500
1984	200	18,100	4,400
1985	32	6,601	2,800

Beginning in 1981, through cooperation with the Montana Department of Fish, Wildlife and Parks, the Canada goose hunting season has been closed during the month of October on the refuge and adjacent land. This was done to protect our resident nesting flock. The refuge goose production objective was revised from 100 to 500 in 1981. It appeared we were heading in the right direction up until this year. Hopefully in 1986, water conditions will improve and with the initiation of predator control (G.15) we will get back on track.

The fall migration began in September and peaked at 2000 on October 4th. A record high of 94,893 use days corresponds with our increasing resident population and increased fall use by migrants.

No white-fronted geese were observed on the refuge this year. Past records show that small numbers of white-fronts infrequently are observed during the fall migration.

Ducks

Due to the late cold winter, the first spring migrants were approximately one month behind schedule. Mallards, pintail and common goldeneye arrived on March 15. By the middle of April, 74,850 ducks had concentrated on the refuge.

The fall migration peaked at 83,900 just prior to the snowstorm and freezing conditions on October 6 to 8. The cold temperatures of the 6th through the 8th froze all the water units driving most of the birds southward. The units reopened by the 12th on the opening day of waterfowl season. Waterfowl use days were significantly influenced by water conditions. Table V compares previous years of waterfowl use.

The 1985 duck production was projected as 6,601 with gadwall, shoveller, and scaup the primary producers. Production was computed by taking the breeding pair count, multiplied by the Mayfield hen success (36%) and then multiplied by the average brood size to flight. Tables VI and VII compare projected production and breeding pair counts in previous years. The low production figure this year correlates with the low water conditions and high predation observed.

The nest study proposal written in 1983 was designed to obtain reliable estimates of nest success and density in each habitat type. We could then project duckling production for each habitat type. Nineteen eighty-five was the first year we were able to complete all stages of the study. However, in 1985 the refuge experienced its lowest spring water levels in quite some time and low waterfowl numbers. We didn't find enough nests in each habitat type to compute nest success, density and production with confidence intervals that were meaningful.

We did gain valuable information in that significant predation was taking place in all habitat types. We found enough nests (92) in our DNC sample plots to compare Mayfield 40% nest success rates with the previous two years of data collection. The Mayfield 40% nest success rate in DNC for 1983 was 51.2%; in 1984 52%; and in 1985 10.6%. The combined habitat sample data totalled 183 nests - 75 nests were successful; 108 nests were unsuccessful, of which 101 (94%) were destroyed by predators; and 7 (6%) were abandoned. The complete 1985 nest study report is available in the refuge file.

Coots

Coots were first observed March 27th. The spring migration peaked at 9000 and the fall migration at 12,000. The shallow water management is developing extensive stands of alkali bulrush and the coot are beginning to respond to the additional emergent habitat. The drought conditions limited production to 2800, however, coot use days increased compared to the previous two years (Table V).

TABLE VII

HISTORY OF BREEDING PAIR COUNTS

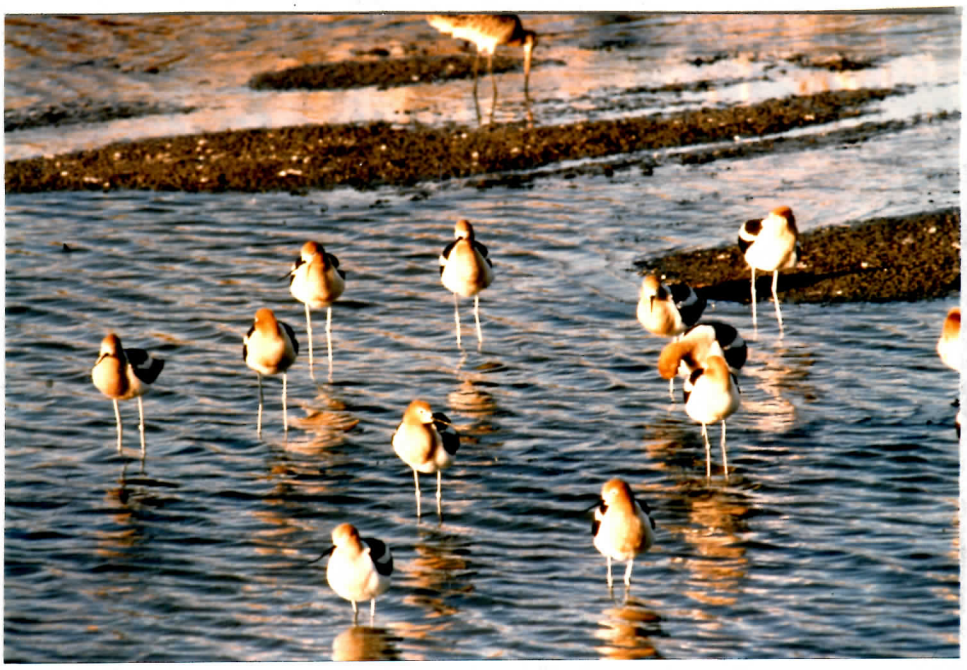
SPECIES	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985
Mallard	26	208	181	113	130	580	623	357	932	368	153
Gadwall	332	979	968	222	665	2068	931	1148	1622	1852	1110
Wigeon	28	187	100	44	60	407	329	121	145	214	44
Pintail	287	612	287	249	335	842	606	451	1038	625	116
G-W Teal	20	53	103	35	34	205	69	43	32	49	42
B-W Teal	278	580	885	178	180	572	836	582	1152	434	254
Cinn. Teal				119	60	303	236	261	249	256	275
Shoveller	260	488	533	245	310	1551	1918	1280	1648	792	417
Redhead	113	443	233	354	100	712	393	318	260	192	74
Canvasback	70	47	43	380	55	70	61	59	120	28	6
Scaup	295	362	231	537	225	1015	614	659	883	711	394
Ruddy	119	107	124	108	60	159	245	117	94	86	54
TOTALS	1828	4066	3688	2585	2325	8485	6860	5608	8175	5607	2939
PRODUCTION	3,990	21,750	10,556	7,930	11,520	31,350	21,780	18,092	28,894	18,100	6,601
Available Water - Sur. Acres - May	4623	4545	2741	6001	5982	5000	3966	4077	4041	2938	1815

4. Marsh and Water Birds

The colonial bird register survey was conducted again this year. However, no colonies of eared grebe or black-crowned night heron were observed. This is the first year that small colonies were not observed since the initiation of the survey in 1981. Eared grebe production occurred on the refuge where water was adequate but not in any recognizable colony. No black-crowned night heron nests were observed.

Other nesters on the refuge are the sora and pied-billed grebe. Occasional use by western grebe, horned grebe, red-necked grebe, double crested cormorant, white pelican, American bittern, great blue heron and white-faced ibis occurs.

Only one sandhill crane was observed in May on the refuge. No sandhills were seen during the fall migration.



A group of American avocets and a marbled godwit enjoying the shallows of Unit V during reflooding. Several hundred avocet nest at Benton Lake each year.
09/85 85-20-35 DO

5. Shorebirds, Gulls, Terns and Allied Species

The June colonial bird survey found Franklin's gull colonies in Units IV and VI. Ten thousand square feet were sampled in each colony to determine nest density and the entire size of the colony was planimetered on aerial photos. The projected estimate on the refuge this year was 24,847 nests located in four colonies covering 120 acres.

California gulls began establishing colonies on the islands in Unit VI the first part of May. Control measures were taken to keep the California gull nesting population within approved limits.

A small common tern colony of 12 nests was located on an island in Unit VI.

Shorebirds which nested successfully this year were the American avocet, Wilson's phalarope, marbled godwit, upland sandpiper, willet and killdeer.

6. Raptors

Marsh hawk, short-eared owl and Swainson's hawk nested on the refuge this year. This is the first year that the Swainson's hawk has been documented as successfully nesting at Benton Lake NWR. Besides the raptors mentioned in the Endangered/Threatened Species section, non-nesters seen on the refuge this year were red-tailed hawk, American kestrel, rough-legged hawk, golden eagle, great horned owl, Cooper's hawk, sharp-shinned hawk, gyrfalcon and snowy owl.

8. Game Mammals

Both white-tail deer and mule deer use has been increasing on the refuge. Fawn of both species were seen.

The local antelope population is quite low. However, antelope use increased dramatically on the refuge this year due to drought conditions. Small bunches of 5 to 10 were seen regularly on the refuge during the summer. Several does fawned on the refuge and a herd of 27 was seen in the fall.

10. Other Resident Wildlife

Pheasants experienced a better than average hatch on the refuge this year compared to the rest of the state. Statewide populations have dropped sharply during the drought. A pheasant crow count survey route was established in 1983 to monitor population trends. Four counts are made from mid-April to mid-May. The average number of crows recorded per station in 1985 was 3.0; 1984 was 2.5; and 1983 was 3.9. The fall of 1983 was the first year the refuge was open to pheasant hunting. The extreme cold temperatures combined with the snow cover in November resulted in the observation of weather stressed pheasants. Over winter losses may be significant.

The gray partridge population remains low and production hasn't been keeping ahead of mortality. The late May snow storms experienced in 1982 and 1983 really affected local partridge populations.

Sharptail grouse were seen occasionally on the refuge. Production was suspected this year in DNC-2 but no broods were observed.

The first Swainson's hawk was successfully raised on the refuge this year in a Russian olive tree on the west side.
07/16/85 85-10-37 RLP

Short-eared owls regularly nest in our DNC fields - there seems to be a good food supply available.
05/85 85-8-25 BB

Other resident wildlife include rattlesnake, garter snake, coyote, badger, raccoon, skunk, mink, long-tailed weasel, least weasel, muskrat and the most abundant of all, Richardson's ground squirrel.

15. Animal Control

We have an approved control program on white-tailed jackrabbits and California gulls. The rabbit control is to protect headquarters shelterbelts and landscaping. In January a herd of approximately 50 jackrabbits was observed around headquarters. Damage was occurring to shelterbelt shrubs and ponderosa pine. Twenty-eight jackrabbits were removed and a February thaw helped disperse the remaining jackrabbits.

California gulls set up nesting colonies on two islands in Unit IV and on all islands in Unit VI. By the third week in May 600 gulls were present. Measures were taken to reduce the number of nesting gulls to the approved level of 200 pairs.

In December a predator control study was approved for the removal of skunk and raccoon from March 1 to July 15. The predator control will be initiated in 1986 to evaluate its effect on local waterfowl nesting success.

16. Marking and Banding

A banding carousel using alumimum rods was constructed by Dennis Orthmeyer. This did much to facilitate record keeping during the duck banding operation.
08/85 Personal Photo DO

Over 4000 ducks were banded by station personnel this year. We're not sure of this mallard's ancestry. A malwall or a ?
09/85 Personal Photo DO

Maybe this is a malpin or a maltail or a pinnard? Which way do they migrate?
09/85 Personal Photo DO

Greg Curry, YCC, and Mark Lanier, Bio Tech, hauling another load of ducks to shore for banding.
08/85 Personal Photo DO

The duck trapping operations were protected from raccoons by the use of live traps.
08/85 Personal Photo DO

The refuge had a preseason banding quota of 1600 mallards. Six Salt Plains duck traps were used for 209 trap days. A total of 4,345 ducks were banded, of which 2489 were mallards. Table VIII gives the results of the 1985 duck banding at Benton Lake. Unusual catches were one black duck, one mallard-pintail cross and 1 mallard-gadwall cross.

TABLE VIII

1985 DUCK BANDING AT BENTON LAKE

SPECIES	AHY #	AHY (%)	HY #	HY (%)	UNKNOWN	TOTALS
Mallard (M)	1176	(47)	596	(24)		1772
(F)	413	(17)	304	(12)		717
Sub-Total	1589	(64)	900	(36)		2489
B-W Teal	200		1025		1	1226
G-W Teal	49		373		4	426
Gadwall	3		64			67
N. Pintail	32		31			63
Redhead	7		23			30
L. Scaup			21			21
A. Wigeon	3		13			16
N. Shoveller			2			2
Ruddy Duck			1			1
Black Duck	1					1
Canvasback	1					1
Mallard X Pintail			1			1
Mallard X Gadwall	1					1
TOTAL	1886		2454		5	4345

17. Disease Prevention and Control

A tight grip on weekly cleanup operations during July to September helps keep botulism mortality down. We picked up 113 ducks and 96 marsh and water birds this year. We have developed a refuge file marking the hot spots within each unit on a refuge map. This is done annually for comparison and it also provides a reference for spots to be inspected closely during the weekly cleanup operations. Table IX compares previous years' botulism losses.

TABLE IX

BOTULISM LOSSES AT BENTON LAKE

YEAR	Unit I	Unit II	Unit III	Unit IV	Unit V	Unit VI	TOTAL
1970	603	1365	5197	9098	3405	1841	21,419
1971		927	6295	2212	2627		12,061
1972	34	45	402		2964	6760	10,205
1973			1665		95		1,760
1974			986				986
1978*	65	2	24	719			810
1979	11	25	13	1017	19	63	1,148
1980		12	32	71	419	1272	1,806
1981*		10	15		15	10	50
1982	57	690	43		10		800
1983	11	62	61	170		10	314
1984	25	187	434	137		185	968
1985		116		34		59	209

*No botulism losses were recorded in either 1975 or 1976. A scattering of badly decomposed duck carcasses were noticed in the fall of 1977 - cause of death was suspected to be botulism. In 1981 the weekly cleanup operations picked up 50 birds - cause of death unknown.

H. PUBLIC USE

1. General

The refuge tour route is open to visitor use during daylight hours except during the winter months. The refuge was opened to the public on March 29th this year. A nine mile tour loop allows visitors to view three of our six water units surrounded by native prairie and contrasting DNC fields. We have no interpretive facilities. A refuge leaflet and bird list are available.

2. Ourdoor Classrooms - Students

The Great Falls School District conducts field trips to the refuge for the third and seventh grades. School district environmental education instructors have developed a program covering invertebrate life, ornithology and botany. This year 1901 students and their teachers visited the refuge. We are looking at shifting part of this concentrated use to the fall period to reduce disturbance to nesting birds.

7. Other Interpretive Programs

Conducted tours and discussion of Benton Lake operations were given to individuals representing a variety of organizations:

Cynthia Hamlett, Archaeologist for Lewis & Clark National Forest
Frank Feist, Manager of Freezeout Lake Waterfowl Management Area
Hank Fischer, Defenders of Wildlife

Ducks Unlimited biologist Bob Hoffman and engineer Dave Thompson
Upper Missouri Breaks Audubon Club
Salvation Army
Boy Scouts

Benton Lake personnel made presentations and contacts with:

Upper Missouri Breaks Audubon Club
Northern Prairie Wildlife Research Center
Kleinschmidt Lake Mitigation Committee
Marias River Weed Action Committee
Cascade County Commissioners
Western Area Power Administration
Local Congressional offices of Senator John Melcher and Representative Ron Marlenee
Ducks Unlimited
Army Corps of Engineers
Great Falls Tribune
Sacramento Bee News
KRTV
Cub Scouts

8. Hunting

The 1985 waterfowl hunter use was significantly affected by both weather and a two week delay in the opening (October 12) of duck hunting. As mentioned earlier, the early freezing conditions on October 6 to 8 sent most of the early migrants south. By the time duck hunting opened, big game hunting (antelope) had also begun. These factors resulted in a record low hunter use and harvest since the initiation of hunting in 1966. Approximately 724 hunters harvested 497 ducks, 20 Canada geese, 20 snow geese, 20 Ross' geese and one tundra swan.

Approximately 61 hunters harvested 32 pheasants. Success was limited to hunters with dogs working the heavy cover.

10. Trapping

The current trapping plan allows the trapping of muskrats. The removal of muskrats is primarily aimed at the portion of the muskrat population that is dwelling in the dike system. Trapping of muskrat houses is not allowed and a portion of the refuge is closed to muskrat trapping. We are currently allowing spring muskrat trapping on a high bid selection basis every other year. This year, Larry DiLulo was awarded the permit with a high bid of $637.51. This was Larry's second consecutive trapping permit and he is very effective in removing troublesome muskrats from the dikes of the lower four units. This year his trapping effort was extended due to a late spring. Trapping began on February 5 and finished on April 1 with 627 muskrats caught.

11. Wildlife Observation

Approximately 8222 people drove through our tour loop this year, primarily

to view the concentrations of waterfowl during the spring and fall migrations.

17. Law Enforcement

Most of our law enforcement activity is centered around the general waterfowl season. This year eight violations were cited into court; all of which forfeited the appearance bond.

Violations that occurred were shooting after legal hour, take with the aid of a motor vehicle, take migratory non-game bird, take Canada geese during closed season and hunting with unplugged shotgun. At year's end all cases were closed and $609.00 was paid on forfeited appearance bonds.

Warnings were issued to nine individuals involving fourteen observed violations, all of which involved some form of hunting activity. Nine of the fourteen infractions involved 5 juveniles in 2 cars with a small arsenal of firearms - a day off from school!

I. EQUIPMENT AND FACILITIES

1. New Construction

a. Canals and Islands

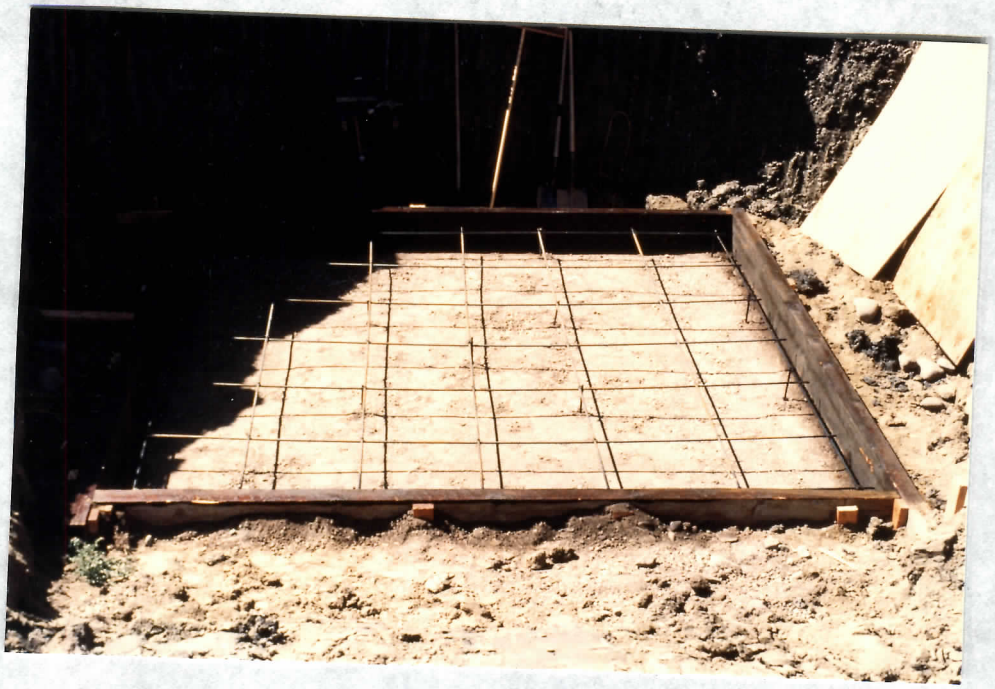
The planned canal and island construction in Unit III was delayed this year. C. M. Russell NWR's scraper was scheduled to be used by us in September of this year, but due to the extremely wet fall, no construction was possible. The scraper, which had been picked up in Lewistown by Maintenanceman Marko, was taken to a Great Falls commercial shop for repairs and then returned to CMR.

b. Units III and IV Pumpsites

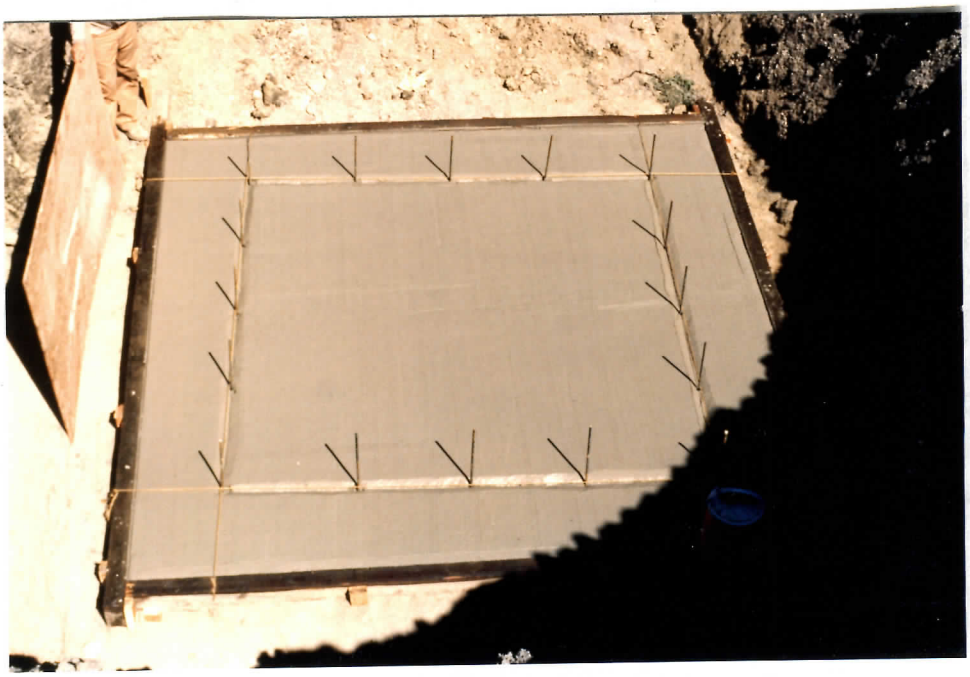
Cat begins excavation for the Unit III pumpsite near the southeast end of the main distribution canal.
09/85 85-21-21 DO

Two concrete pumpsites were constructed by force account in Units III and IV. The pumpsites are designed for the use of a 20 inch vertical electric pump. With these pumpsites better water management of water levels can be used, especially when salt levels in the water get too high. The units then will be able to be drained and flushed.

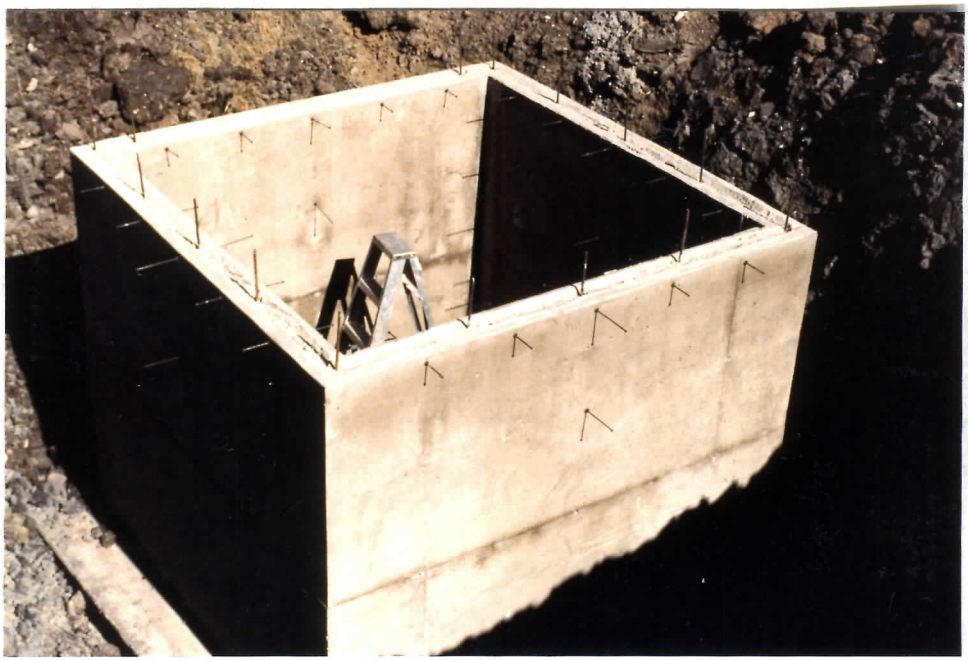
The pumpsite in Unit III has a 12 foot by 12 foot by 1 foot base and 8 inch by 16 foot high walls. Unit IV pumpsite has a 12 foot by 12 foot by 1 foot base poured around a previously set in 8 foot deep concrete culvert 7 feet in diameter. It has 8 inch by 8 foot high walls. The pumpsites require a 24 inch diameter discharge opening; a channel iron slot to provide a structure board opening; wall inserts to suspend I-beam supports for the pump; and a four inch opening for underground electric cable which plugs into the electric motor. The reusable concrete forms were engineered and constructed by Maintenanceman Vince Marko for the pumpsite in Unit V in 1984.



Unit III pumpsite base pad formed and ready for concrete.
08/29/85 85-11-26 RLP



Maintenanceman Marko prepares to start erecting forms for the lower 8 foot section of the Unit III pumpsite. Note rerod and construction joint.
08/03/85 85-11-29 RLP



The top row of snap ties are left in place to anchor the bottom section of the forms on the next pour - - Unit III pumpsite.
09/20/85 85-11-32 RLP

Mark Lanier, Bio Tech, and Maintenancemen Vince Marko and Scott Foster receiving the last "mud" for the top 8 foot section of the Unit III pumpsite.
09/25/85 85-12-11 RLP

c. Ducks Unlimited Construction - Unit IVb

Since the March 14, 1984, signing of the Memorandum of Understanding between Ducks Unlimited, Inc. and the U. S. Fish and Wildlife Service, DU has constructed many waterfowl habitat improvement projects. The largest project so far has been constructed at Benton Lake NWR in northcentral Montana.

In March of 1985 refuge personnel submitted to DU a project proposal for subdividing the large Unit IV impoundment and the construction of three 2 acre nesting islands.

In May DU approved the project and in June DU decided to fund the construction for 1985. During the months of July and August refuge personnel along with DU engineers and biologists designed the project. An 8100 foot dike and two water control structures would subdivide Unit IV creating a new 393 acre impoundment. Two 2 acre islands would be constructed in the middle of this unit. Fifty-one hundred feet of level ditching would connect the borrows of the dike and islands. A third 2 acre island would be constructed in Unit III. All three islands and the impoundment facing side of the dike would be rip rapped. The refuge would plant the islands and the dike to develop waterfowl nesting cover.

In September the project was placed on bids and in October work began. By January 29, 1986, the entire project was completed.

Aerial view of Ducks Unlimited project showing the relationship to other marsh units. Dirt work was nearly completed on the IVb dike and beginning on the south island.
10/31/85 Personal Photo TT

DU project construction layout showing hourglass island shape, wide bench and surrounding moats with inter-connecting angled canal system tying into the perimeter dike borrow areas which also form a surrounding moat even at low water levels.
10/31/85 Personal Photo TT

Brad Karel, Ducks Unlimited, (Bismarck office) inspecting first concrete delivery and placement into the base pad on the Unit IVb outlet water control structure.
10/21/85 Personal Photo TT

Karel conferring with the driver while the contractor, United Materials of Great Falls, is placing concrete into the 9'4" tall outlet control structure on IVb.
10/22/85 85-13-6 RLP

The 4 inch wide seep collar was prefabricated off site, then hauled in and assembled with the 36" x 22" arch pipe. The bedding gravel shown here proved to be a problem with the structures leaking. The contractor had to excavate and redo two of the joint seals and recompact the dike fill over this structure.
11/07/85 85-21-3 TT

Final fill and compaction work on the inlet structure near the west end of the 8100 foot IVb dike, as viewed from the end of the stub dike. Highwood Mountains in the background.
11/15/85 85-21-13 TT

Concrete being placed in the forms on the IVb inlet structure. An extra thick base pad was placed under this structure due to an excess subsurface moisture problem.
11/05/85 85-19-25 TT

The completed IVb inlet structure as seen from the IVa canal. Note the twin metal arch pipes which release water from Unit 11. This water can then be either diverted into IVb, or IVa, or both simultaneously.
01/31/86 86-2-9 RLP

We anticipated that the dirt part of this contract would be undertaken primarily with the use of scrapers. This D8 and D9 were the main movers, with a D6 doing finish grading and a sheepsfoot roller compactor solidifying the pushed up fill.
11/05/85 85-19-6 TT

Two scrapers were brought in briefly to solve a problem of excess fill at the tailend of the dike. The materials were originally supposed to be incorporated into the dike - a communication problem - readily resolved by DU. Gee! It was fun working with DU and a quality contractor!
11/05/86 85-19-2 TT

In an effort to meet the Ducks Unlimited construction completion date, the Cats operated two and sometimes three shifts - - even at 20 below zero and through ground blizzards! November, 1985, was the coldest on record in Great Falls, MT.
11/13/85 85-21-9 TT

On this cold day the Cats moved into Unit III and in "sunny" midafternoon began opening the warm frozen earth to let out the steam. Soil moisture conditions were so moist that without the cold temperatures, this island probably wouldn't have been built.
11/21/85 85-21-21 TT

Working frozen marsh bottom soils at 20 below wasn't as difficult as we imagined. A D9 with a single chisel point breaks through one foot of frozen soil easily - - but how do you drill seed into that surface? The south island covered 3.26 acres.

11/20/85 85-21-15 TT

These "boulder field" islands were walked down using the D9, thus making the tops of the islands easily plantable using the refuge drill. The frost action on the heavy clays in any remaining dirt boulders crystalized them and they would then quickly crumble with a kick of the boot.

11/21/85 85-21-19 TT

Delivery of sandstone rip rap began with a total of 1,596 cubic yards placed on the slopes of the three islands and on slopes of the new dike ($17.50/yard in place).
12/04/85 85-21-25 TT

The northern most island, completely encircled with sandstone slab rip rap, encompasses 1.8 acres and is six to seven feet high.
01/31/86 86-2-29 RLP

Completed dike IVb showing sandstone rip rap on inside (3:1) slope of dike.
01/31/86 86-2-30 RLP

Unit IVb dike with gravelled top and unprotected outer 5:1 slope which will be planted to a grass mixture. Borrow areas partially filled at the 3612.8 elevation.
01/30/86 86-2-1 RLP

Erosion protection on the upper segment of the old Unit IV dike was beefed up with this added layer of sandstone rip rap as part of the Unit IVb DU project.
01-31-86 86-2-32 RLP

The connecting level ditches between the islands and the dike borrow ditches were angled at every 125 feet to increase their biological potential for duck breeding pairs.
01/31/86 86-2-31 RLP

Some 2736 tons of crushed road gravel were delivered and placed by the DU contractor, including this new parking lot at the junction of the II and IV dikes. Dark soil on the left is from cleanout operations on the II dike borrow area facilitating a continuous moat and brood travel lane around the unit.
01/31/86 86-2-35 RLP

Unit V was dewatered in 1983 and 1984 and a perimeter and interior canal system excavated to facilitate positive drainage into the pumpsites. Excavated materials were used to construct 66 low profile loafing islands, 2 peninsula cutoffs and one 4 acre circle dike. Water shortages (pumping $) delayed refilling the unit until the fall of 1985.
10/31/85 Personal Photo TT

d. Equipment Storage Building

In August Talcott Building Company of Great Falls submitted a bid of $72,621.00 for a 40 foot by 155 foot metal storage building. The building will be used for cold storage and a carpentry shop. Four bays have overhead doors and two bays are open. The south bay is 40 feet by 40 feet with a concrete floor. All other bays have gravel for flooring. By year's end the building was finished except for concrete aprons and drain spout splash blocks. One problem was noticed in the design of the overhead doors - they are inset and when closed rest on the gravel rather than on a concrete sill. Corrective measures will be taken to fix this. Other adjustments made included placement of tar and felt paper around the foundation which was purchased and installed by refuge personnel.

One subcontractor crew was replaced due to poor attitude and performance on backfill and compaction work and one partial truckload of concrete mix was rejected by project inspector Pearson. We are anxious to get the building into service. It will relieve congestion in our existing shop and will give us space for storage of equipment that has been sitting out in the weather.

Equipment storage building contract. Northern Testing conducting soil tests to provide foundation design recommendations for the new 40 x 155 foot storage building.
05/15/85 85-6-38 RLP

Talcott Construction crew placing concrete pillars to support the main structure. We found their concrete work to be almost flawless and their people easy to work with on needed clarification and changes as the project went along.
09/25/85 85-12-8 RLP

Columns and grade beams in place and finished, then bead board placed on the columns to provide a bond breaker. The refuge added 15 lb. felt paper along the outside of the grade beam. This is to reduce foundation movements caused by the pressures from the very expansive clay soils with moisture and temperature changes. Backfill and compaction was done by subcontractor.
10/30/85 85-14-9 RLP

Subcontractor moisturizing and compacting 8 inches of sub-grade clay materials to bring it up to optimum moisture content and 95% proctor density compaction to form the base for a 40' x 40' concrete floor. The theory was to expand the clay and seal the moisture in so it won't move!?

Subcontractor placing and finishing 40' x 40' concrete slab as Scott Foster places gravel flooring in the remaining bays.
11/04/85 85-18-28 RLP

Refuge Maintenanceman Scott Foster operating the forklift helping the contractor off-load the steel for the new storage building. Roof and wall sheeting are on truck to the right.
10/30/85 15-14-6 RLP

Main framing finished, the erection crew busy with wall sheeting.
11/14/85 86-1-10 RLP

By the end of the year, the contractor had completed this $74,205 contract except for a few small items. Final concrete work will await warmer temperatures this spring when the 3' x 90' front apron will be placed. Metal pipe bumper posts will be set in to protect the door frames inside and out at each of the overhead doors.

It will be great to be able to separate the carpentry operations from the mechanical shop and to store most of our motorized equipment in out of the weather.

01/31/86 86-2-37 RLP

Original (1958) design of structure #29 along Lake Creek didn't provide a necessary turn out diversion for delivery of water to a private stock pond (mandated). Jury-rigged plank and posts in foreground.
09/84 84-11-16 RLP

This farm crossing and water diversion point (structure #35) is somewhat the worse for wear - - alkaline corrosion, electrolysis from an adjacent crude oil pipeline and flood waters over the past 23 years have taken their toll.
09/84 84-11-9 RLP

2. Rehabilitation

a. Lake Creek

The Lake Creek rehab project was started in the fall of 1984 with a 75 day performance period by Excavating Service of Belt, Montana, for a bid of $69,389.00. On site work began on October 12, 1984. Due to cold snowy weather conditions in late December, they had to shut down operations. The contract called for the removal of three corrugated metal pipe structures to be replaced with concrete arch pipe and the construction of attached concrete drop inlet structures. The new structures are designed to slow the flow of water and to divert water into Burgmaier's stock ponds. Three old rock drop structures were removed and the canal resloped and shaped due to extensive soil erosion.

The project required closer supervision than normal as the contractor liked to take "short cuts". The resloping, compaction and rip rapping were finished prior to summer pumping. While compacting, the operator of the machine hit one of the structures busting off a corner. This was later fixed and during a brief shut down of the pumps in July a final inspection was conducted by Ken Fox of Engineering,

The design of the structures was to fill two of John Burgmaier's stock ponds. Structure No. 29, completely closed with stop logs and with three pumps running, resulted in 3 inches of water running into the pond, while the remainder went over the overflow. Structure No. 35 did not raise the water high enough to divert any water into the stock ponds.

After the pumping season ended in September, refuge personnel dewatered the structures and arch pipe for the contractor to make inspections and minor repairs - - the contractor failed to show up. Engineering and Contracting have been contacted about corrective measures. We're not holding our breath!

Structure #31, being replaced with concrete arch pipe, was the longest crossing due to its section line location with vehicle access needed on both sides of the fence.
11/09/84 84-15-29 RLP

Wet and cold weather, contractor inexperienced with the ram neck joint seal gasket, poor joint alignment and compaction led to the contractor's having to excavate and reset this structure (#35).
11/09/84 84-15-36 RLP

The shoddy work of this contractor soon became evident, incomplete excavation and compaction, no visqueen, no vibration of footing wall and inconsistent effort of protecting fresh concrete from cold temperatures - inspection became frustration.
11/09/84 84-16-17 RLP

Winter weather in Montana, ungravelled access roads, and the construction site some 15 miles from headquarters added to the daily inspection task. The contractor finally shut down on 12/21/84. Note snowdrift on right.
12/07/84 85-1-12 TT

The contract called for an approved plan to protect the construction site from water. Spring runoff was extremely light, but runoff flowed freely through all three partially completed drop inlet structures.
03/18/85 85-2-6 RLP

Spring flows in Lake Creek partially overflowed the adjacent pasture as well as through and all around the new structures (structure #31).
03/18/85 85-2-14 RLP

When spring runoff ceased, the "protective" canal dirt plugs retained water in the construction work site. After some delay, the contractor finally responded to our request to dewater the sites and get on with the construction.
04/24/85 85-4-21 RLP

During spring runoff, about one foot of silt was deposited in the arch pipes of structures 29 and 31. Most of this had to be removed by the contractor to allow inspection of repair of pipe joints. We became concerned about the hydraulic design on these structures in relation to future silt deposits.
05/13/85 RLP

The contractor was informed in early April of the need to begin pumping water through these structures by May 24th. Drought conditions were adversely affecting habitat at the refuge. The last structure (#29) was finally poured May 8th.
05/08/85 85-6-8 RLP

Failure to read and heed contract specifications and continued shoddy workmanship was the rule. Note the visqueen which was used to cover the dirt form wall at the junction of the structure. The concrete at this critical point was only 5½" instead of the 9" called for in the specifications and drawings.
05/08/85 85-6-10 RLP

Inspection of structure #29, after the forms were removed, showed further proof of incompetent construction procedures. Deflected main cut off wall. Engineering finally agreed to send out the technical representative to look at the work!
05/13/85 85-6-31 RLP

"Formed" collar at junction of arch pipe and cutoff wall. The large void under the pipe was filled and compacted with a soil and cement mixture or "soilcrete" as per Engineer Ken Fox's advice.
05/22/85 85-7-26 RLP

Lake Creek structure #29 with the first of two slot forming boards removed. A problem of both design and construction method. No reinforcement in slot areas of concrete and moisture uptake in wooden form blocks caused the concrete to crack. The slot should have been formed with (aluminum) channel iron with anchor ties into the concrete and rebar. See July 16 photo of same.
05/13/85 85-6-23 RLP

Stop log slot detail showing form method. Note hairline crack lower inside corner running toward outside (left) of structure #31.
05/22/85 85-7-23 RLP

Structure #29 outlet: angular granite rip rap was placed at the outlet. A bedding of sand (10'x12'x6") was placed under the rip rap on the outlet canal bottom, instead of under the entire rip rapped area. Drawing detail error in contract.

05/22/85 85-7-33 RLP

Due to a critical water shortage at the refuge, the Muddy Creek pumps were turned on before the contractor was finished, as allowed under the contract terms - - thank goodness.

05/27/85 85-7-35 RLP

The contractor's equipment busted the north pier of structure #29 during backfill and compaction operations. Note the amount of water back pressure in the structure, silt deposited 18 inches deep in this structure with only one pump operating.
07/01/85 85-10-12 RLP

Newly completed structure #35 with one pump operating (16 cfs). Note the lack of water back pressure, no silt deposit problem occurred with this structure.
07/01/85 85-10-1 RLP

As is shown here on the south pier of structure #29, serious cracks were present on all structures when the form boards were removed. The contractor was asked by Engineering to grind out a notch in the cracks and grout over with wellcrete sealant. The result looked good - - and might hold through the warranty period - - or maybe not. A 30 inch segment of the outer lip on the south pier of structure #35 came off during the winter of 85-86.
07/16/85 85-10-22 RLP

Cow power at work on the recently reshaped canal slopes just above structure #35.
07/16/85 85-1--27 RLP

After water in Units I and II was replenished the pumping was shut down long enough for the contractor to remove, reform and pour the north pier on structure #29.
07/16/85 85-10-31 RLP

All of these structures under the Lake Creek contract were supposedly designed with both a drop and a diversion function. This photo shows residual water held at structure #35 following an unsuccessful attempt to divert water into an adjacent stock pond. At full pumping capacity (3 x 16 cfs) all of the water was being passed through the side spill slots on this structure. The stock pond canal was 0.9 foot higher than the structure spill slots.
09/26/85 85-12-14 RLP

b. Buildings

The office had the carpet replaced in the entry. The office basement concrete floors were patched and painted, along with remodeling the basement bathroom into a lab. The sink, urinal and shower were removed and replaced with a stainless steel sink and counter top. Cabinets, new lights and fresh paint completed the job.

Eleven eight foot - two tube high output fluorescent lights were installed in the shop work area. This made a great improvement over the small four footers previously used. The four foot lights were installed in the stall that houses the water truck and iron rack.

In July the Muddy Creek pumphouse was reroofed by A. T. Klemens of Great Falls.

c. Utilities

In April three new 1500 gallon concrete cisterns were installed to replace the 4000 gallon metal tank. Time and elements finally caused the old tank to rust through and the fill spout to break out. The new tanks were buried in the ground about ten feet deep, connected together using plastic pipe, and hooked up to a new bladder style pressure tank and pump. This new system also took care of the low water pressure at quarters 82 which is at the end of the water line.

3. Major Maintenance

In July the Muddy Creek No. 3 pump was dismantled under the supervision of Alan Mecham of General Pump Company, Salt Lake City, Utah. General Pump had rebuilt the pump in 1984, but after installing the pump it began leaking water around the main shaft. A crack was then noticed in an impeller case housing. Still under warranty, General Pump took the housing, shaft and bearings back for repairs. The pump was later installed and ran fine for the remainder of the pumping season.

The No. 2 pump butterfly valve had to be replaced when a molded seal was broken and the valve plate cracked. All three pumps had new kits installed in the air valve units that control the butterfly valves. A new hour meter was installed in the No. 2 pump panel.

Other maintenance projects:

Buildings

An air circulation fan was installed in the floor of the office to move warm air up from the wood stove in the basement.

Equipment

The clutch was replaced on the D-6 Cat. New windshields were installed

Marko removing the 4000 gallon cistern tank after 24 years of service at headquarters. All potable water must be hauled in. The 3000 gallon water truck served as a temporary water supply during the rehabilitation.
04/17/85 85-4-18 RLP

The three 1500 gallon concrete units nestled in beside the buried pumphouse where a new pressure system was installed. Water service is much improved. Marko also developed a visual sight gauge to measure the water supply.
04/22/85 85-5-32 RLP

on the 1974 stake truck and the 1978 Ford pickup.
A side glass was replaced on the 1961 Dodge stake truck.
Fenders and headache rack were installed on the Mack truck tractor.

Facilities

Weeds and debris are cleaned annually along the thirteen mile Lake Creek canal prior to spring pumping. The Muddy Creek pumpsite is located 28 miles west of headquarters. Prior to pumping, the dam is set up and then taken down and cleaned after the pumping season. The pumps are checked and serviced three times weekly during the pumping season.

Spraying of spotted knapweed, whitetop and Canada thistle along the Lake Creek canal, Muddy Creek and the Bootlegger Trail was given much emphasis this year. Weedar 64 was used. The spotted knapweed has taken over much of western Montana and is now spreading into eastern Montana.

Decking and a guard rail were constructed and installed on the Unit V pumpsite.

Roads and Dikes

Muskrat damage to the dikes was closely monitored and repaired when cave-ins were observed.

Muskrat damage to the Unit I dike being repaired by the maintenance crew.
03/18/85 85-2-1 RLP

Roads were graded when moisture conditions were right.
Roadsides and parking areas were mowed in late summer prior to the hunting season.
Cascade County and refuge personnel worked together in resloping the borrow ditches for better drainage of the county road that borders the south boundary of the refuge.
Safety barriers with reflectors were installed at the outlet structures on Unit I and Unit II dikes. These barriers were installed because of two recent motor vehicle accidents by the using public.

Utilities

The domestic water that is used at headquarters has to be hauled to the refuge cisterns with our 3000 gallon tank truck. Sixty loads were hauled this year.

4. Equipment Utilization and Replacement

Malmstrom Air Force Base is located about 18 miles from the refuge and is the primary source of surplus property. We screen only when convenient but try to maintain a regular liason with their local property office and with GSA Utilization Officer Jerry Musselman of Billings, Montana.

1979 Chevrolet Suburban was acquired from Malmstrom Air Force Base to use on conducted tours of the refuge. Our 1974 Chevelle gave up the ghost.
11/25/85 (rec'd) Personal Photo TT

The following items were received and disposed of as indicated below.

Item Received	No.	Disposition	Received from
1979 Suburban	1	Retained at Benton Lake	Malmstrom AFB
Coleman tent camper	2	" " " "	" "
1981 Jeep	2	Transferred to Bowdoin NWR	" "
Tire chain sets	Many	Retained some, rest to MT & WY refuges	" "
2" aluminum irr. pipe	4500 ft,	Retained at Benton Lake	" "
3" " " "	3000 ft.	Delivered to National Bison Range	" "
Conductivity meters	4	Retained at Benton Lake	USGS, Bismarck, ND
1/2" plywood	Pickup load	" " " "	FWS Law Enforcement (Operation Falcon)
2 x 4's	Pickup load	" " " "	" " "
Deep freeze	1	" " " "	" " "
Railroad ties	100	" " " "	Burlington Northern RR

New purchases included the following:

Automatic level	Belt sander, portable
Tripod and stadia rod	4" angle grinder
Circular saw, portable	Jig saw

An effort was made to initiate disposal action on no longer needed items of property and supplies.

DeLacs NWR picked up the following items:

2 utility trailers and a 1000 gallon water tank

A couple of semi loads of materials and equipment are in the process of disposal through GSA. It's too bad we can't just take our surplus out to Malmstrom AFB and let them recycle it instead of going through the Denver GSA procedures.

5. Communications System

Two mobile units with BLM frequencies were acquired. Mounting brackets and antennas were installed in several of our field vehicles and one of the mobile units was wired into the office to act as our base station. This equipment will provide us with a communications link through the BLM repeater on Highwood Baldy or East Butte to our field crews when out in the far reaches of our wetland management district, some 120 miles from the refuge. This system will save the refuge at least $700.00 per year in operational costs, and hopefully will provide better coverage than our old repeater station did on the Knees Butte.

7. Energy Conservation

In April a quick and dirty National Energy Audit was conducted under contract on the office and shop buildings. The residences and other buildings were not included. Their computer generated report, though bulky, reflects the one hour inspection visit. The information received wasn't as good as a free energy audit offered by the utility service.

J. OTHER ITEMS

1. Cooperative Programs

Numerous day to day activities were coordinated and participated in with the Montana Department of Fish, Wildlife and Parks. The waterfowl field tour and meeting this year was conducted in the Centennial Valley of Montana.

The Missouri Breaks Audubon Club was provided with all species production records for the refuge.

Numerous contacts were made with the Ducks Unlimited office in Bismarck, North Dakota, on construction designs of islands, dikes, level ditches and water control structures.

The Great Falls Tribune was provided information on spring migrational waterfowl use of the refuge, the effects of feeding wild Canada geese at the Missouri River city parks and the effects of tame/wild crosses of ducks and geese which occur at Gibson Park.

Pearson met with an aide of Congressman Ron Marlenee and discussed water shortage problems and identified problems of state and federal wildlife agencies in Montana.

A Memorandum of Understanding was developed between Benton Lake NWR and the Black Eagle Volunteer Fire Department and Cascade Fire District No. 6. The purpose for the agreement was to document the responsibility of each agency on fire protection, suppression, property damage and personal injury.

3. Items of Interest

Refuge revenue sharing checks were delivered to seven counties in February and totalled $12,288. This gives the County Commissioners the opportunity to be briefed on current program status and to provide any local feedback pertinent to our programs.

4. Credits

Pearson wrote the Introduction, Sections A, F, and K. Tornow wrote Sections D 2-4, E 6, 7, G, H and J. Benway wrote Sections B and E 1-5. Foster wrote Section I and Orthmeyer Section D 5. Everyone compiled and edited. Benway typed and assembled the report.

K. FEEDBACK

A beautiful fall sunrise over the distant Highwood Mountains with Benton Lake in the foreground.
11/02/85 85-18-18 RLP

The extra money and effort spent this year at Benton Lake should provide a brighter tomorrow for both the wildlife resource and station personnel. Thanks go out to all the many people who helped make it possible.

The following topics could be expounded upon but will wait until another time:

1. Some "contractors"
2. FORMAL CONTRACTS
3. The concept of contracting out
4. Davis-Bacon Act
5. $2000 construction limitation
6. Rental rate increase of 16.8% based on the C.P.I. - - -
   COLA's of 3.5% in 1985
   0% in 1986
7. Required computers! I don't like the one we "got"!
8. Communication "System" - - is a -- a -- travise "T"
9. The new better Payper PAY/PERS
10. Electronic banking, why not electric T & A's
11. Feedback without process

REVIEW AND APPROVALS

BENTON LAKE
WETLAND MANAGEMENT DISTRICT

Great Falls, Montana

ANNUAL NARRATIVE REPORT

Calendar Year 1985

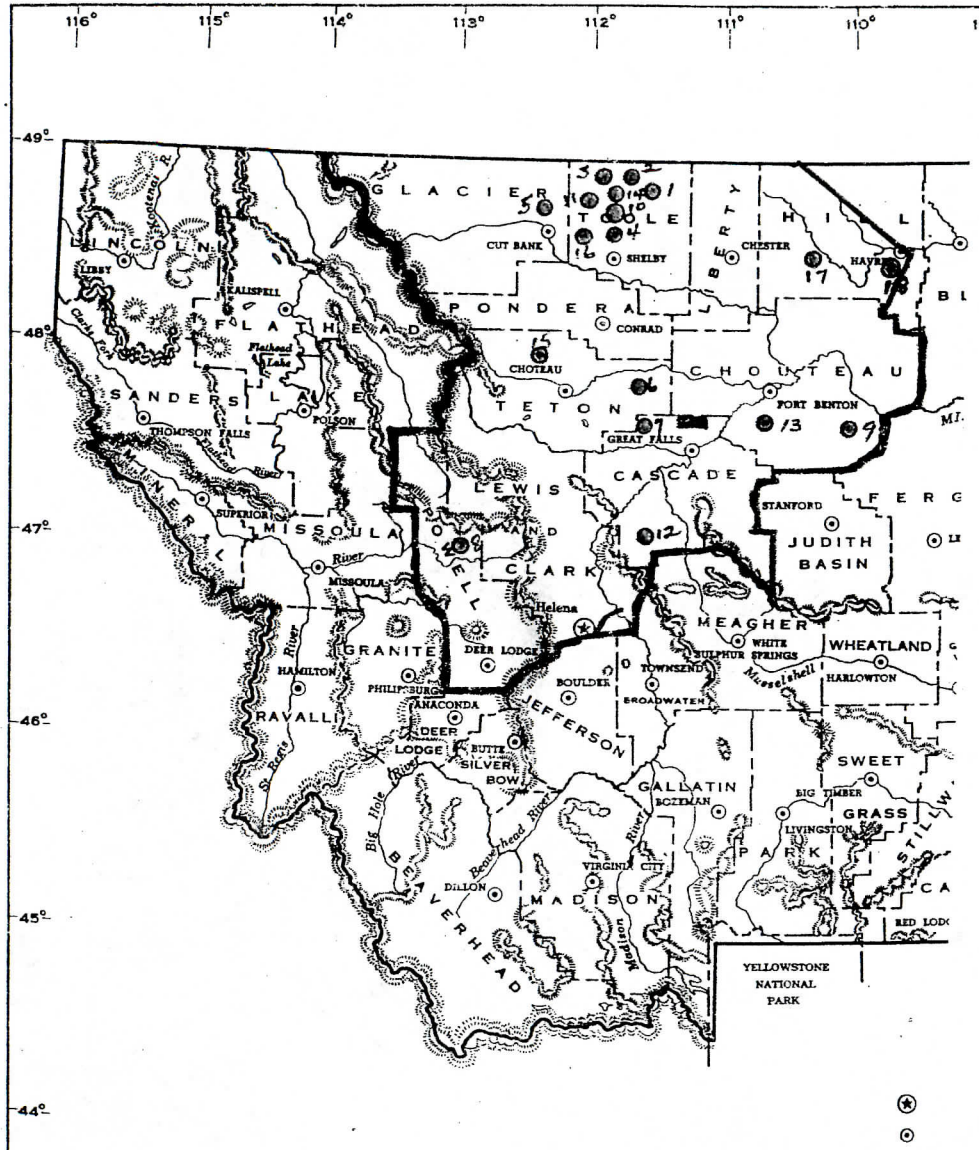
Robert L Lemson — 5/21/86
Refuge Manager — Date — Refuge Supervisor Review — Date

Regional Office Approval — Date

INTRODUCTION

The Benton Lake Wetland Management District was established in 1975. Initial delineation was conducted in 1966 and 1968 and in 1974 and 1975 by Marvin Plenert and Rod King. Acquisition began in 1974 by Realty Specialist Benjamin Lukes.

The district encompasses ten counties in north-central Montana from the Canadian border south to Deer Lodge, Montana. There are easements in all ten counties and waterfowl production areas in seven. The waterfowl production areas (WPA's) are widely scattered; the two farthest away are 120 miles from headquarters - each in opposite directions. The average distance to our WPA's from headquarters is 90 miles, which makes management difficult, to say the least.



BENTON LAKE WETLAND MANAGEMENT DISTRICT

■ Benton Lake National Wildlife Refuge

● Waterfowl Production Areas

1.	Furnell	1,995.00 Ac.
2.	Ehli	472.98 Ac.
3.	Danbrook	327.00 Ac.
4.	Blackhurst	320.12 Ac.
5.	Peterson	94.20 Ac.
6.	Brumwell	251.50 Ac.
7.	Hartelius	307.22 Ac.
8.	McCormick	299.60 Ac.
9.	Kingsbury Lake	3,733.69 Ac.*
10.	Long Lake	645.66 Ac.
11.	Brown	260.60 Ac.
12.	Schrammeck Lake	420.24 Ac.
13.	Thompson	349.58 Ac.*
14.	Barrows	80.00 Ac.
15.	Savik	397.00 Ac.
16.	Cemetary	108.58 Ac.
17.	Hill	280.00 Ac.**
18.	Sands	378.93 Ac.
		10,721.90 Ac.

*These tracts contain acreage under BLM and State ownership

**Leased from the State of Montana

NOTE: ALL OTHER PLACES HAVING 5,000 OR MORE POPULATION ○

MONTANA

15388

INTRODUCTION

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G. WILDLIFE

H. PUBLIC USE

I. EQUIPMENT AND FACILITIES

A. HIGHLIGHTS

1. The Jarina Tract in Pondera County was delineated and approved for acquisition. Page 1

2. Initial development on the Sands WPA was completed. Page 9

3. The easement violation on Glacier County easement 24X-1 was restored. Page 6

4. The wetland management district experienced its third straight year of drought. Page 1

5. The Montana Board of Natural Resources and Conservation approved the Kleinschmidt Lake mitigation project. Page 4

6. A spring and fall easement surveillance flight did not detect any easement violations in the wetland management district. Page 5

B. CLIMATIC CONDITIONS

Climate is discussed in detail in the refuge narrative report. We received very little precipitation in the spring of 1985 and almost no runoff was received into the wetlands. As in 1984, almost every county in the wetland management district was declared a disaster area due to the drought conditions. The wetland management district has experienced its third straight year of drought and most of the permanent Type V wetlands dried up. However, above normal fall precipitation was received.

C. LAND ACQUISITION

1. Fee Title

The wetland district currently has 8498.11 acres under fee title and manages 10,721.9 acres in 18 WPA units. Two WPA's enclose acreage under BLM and State ownership and Hill County WPA (280 acres) is leased from the State of Montana.

No new fee title tracts were obtained this year. An ascertainment report was completed for the Jarina Tract in Pondera County. The unit was delineated and approved for acquisition. This will be the first fee title tract in Pondera County and it will compliment a block of wetland easements surrounding the tract.

2. Easements

No new easements were acquired this year. The district contains wetland easements in each of the ten counties. A total of 7,088 wetland

acres are protected on 133 tracts.

The Jarina Tract, located on both sides of the road in the center of this picture, was approved for acquisition. The tract is near the east slope of the Rockies and will be the first WPA in Pondera County.
06/85 85-9-19 TT

D. PLANNING

2. Management Plan

Objectives for the wetland management district have not been specifically documented, but correspond to the objectives of other wetland management districts under the small wetlands program. Short range development plans are made for each WPA unit upon being acquired. Manpower and funds generally limit our activities to posting, fencing and conversion of cropland to dense nesting cover. Hopefully, once this is accomplished, wildlife will respond without much more maintenance on our part.

ARRM's and Resource Problems funding projects were submitted for the wetland management district.

5. Research and Investigations

Saline seeps are becoming a primary problem due to past and current farming practices. The contamination of water within the district is

primarily due to the fallow cropping system. In 1981, by co-operating with the Triangle Conservation District, a series of shallow cased wells were drilled on two WPA's for the purpose of monitoring subsurface water tables. Data collected from these test wells will provide information on changes in ground water levels in response to our grass-legume planting and adjacent farming activity on recharge areas.

Cooperative education student Dennis Orthmeyer initially set up a Master's Degree research study on waterfowl brood survival under extreme saline water conditions. The study was to be conducted on Kingsbury Lake WPA where salinity readings have ranged from 30,000 to 35,000 micromhos. However, due to drought conditions and after not finding any waterfowl nests during a May nest drag on the area, his research proposal was changed as discussed in the refuge narrative Section D-5. Even though we didn't gain information of brood survival, we did learn that the waterfowl present (primarily pintails and mallards) did not attempt to nest with poor water conditions. Kingsbury Lake was completely dry by early July.

Kingsbury Lake is an extremely saline basin as can be seen with the white beaches. The lake completely evaporated in July and whirlwinds created white tornados depositing some of the salts back onto the uplands.
05/85 DO

E. ADMINISTRATION

The ten county district is administered by personnel at Benton Lake Refuge and does not receive separate staffing or funding.

7. Technical Assistance

Assistant Manager Tornow and representatives from the Montana Department of Fish, Wildlife and Parks, Montana Department of Natural Resources and Conservation, Bureau of Land Management, and the Bonneville Power Administration were selected to form the Kleinschmidt Lake mitigation committee. Development proposals on Kleinschmidt Lake and adjacent FWS wetland easements were discussed as a possible mitigation project for losses of waterfowl from power lines crossing the Missouri River in the Helena Valley. Upon completion of a hydrological study, water rights search, land and water elevation survey, two public hearings, and additional funding and assistance from Ducks Unlimited, the project was submitted to the Montana Board of Natural Resources and Conservation for their approval. The mitigation committee met with the Board of Natural Resources and Conservation on October 11 and explained the project proposal; development of islands, cut-off peninsulas and filling in of an old drain to mitigate for waterfowl losses. The Board approved the project and gave permission to proceed with necessary permit clearance, landowner agreements and development in 1986.

8. Other Items

Revenue sharing checks for Fiscal Year 1984 were received in February of 1985 at 74% of entitlement. Revenue sharing checks were delivered to the Cascade, Chouteau, Hill, Teton and Toole County Commissioners. Revenue checks were mailed to the Glacier and Powell County Commissioners.

F. HABITAT MANAGEMENT

2. Wetlands

Two of our WPA's have water control structures. One at the Ehli WPA cannot be used until the necessary private inholding is acquired. The other structure at the Furnell WPA is dependent on adjacent landowners' willingness to divert water toward the WPA.

The natural wetland basins are dependent on local runoff and rains, little of which have occurred from 1983 through 1985. Only two WPA's (Furnell and McCormick) contained limited amounts of water by summer's end. This is the driest it has been since the district was formed.

4. Croplands

This year we administered two cooperative farming permits for 99 acres. The cropland is used to alleviate crop depredations in Toole County as part of a public relations agreement. Barley was planted on 46 acres and the remaining 53 acres were summer fallowed. The barley burned up

before it reached shoot stage which exemplifies the extreme drought conditions.

Since 1978 we have converted 1859 acres of cropland in the wetland management district to DNC.

5. Grasslands

The 18 WPA's currently contain 4366 acres of native short grass prairie. Our management initially is to rest these areas from grazing and to fence the boundaries where necessary to prevent trespass grazing.

10. Pest Control

The drought conditions provided a good hatch of grasshoppers in the district. Complaints were received from landowners adjacent to two of our WPA's. Clearance was obtained for chemical control, but no authorized spraying operations were undertaken.

11. Water Rights

The water rights filed in 1982 for Furnell and Kingsbury Lake WPA's were inspected this year. Further documentation of the water rights on Kingsbury Lake was conducted and Ray Buchanan signed the water rights affidavit on two additional stock dams for engineering to file on. The stock pond/dam structures were measured and a considerable amount of use by deer, antelope and sharptail grouse and waterfowl was observed.

13. WPA Easement Monitoring

Wetland easement surveillance flights were flown on June 20 and October 31. Easement compliance, wetland roundout acquisition possibilities and trumpeter swan use was monitored. No obvious easement violations were noted; however, several old drains near easements need to be ground checked.

On July 18 refuge personnel and Supervisor Barney Schranck inspected wetland conditions in the wetland management district and inspected the Jarina Tract.

Aerial photos were ordered from the Department of Agriculture (ASCS) to complete our coverage of Toole County easements. All easements were mapped and townships, ranges and sections marked.

The Glacier County ASCS indexes were used to compile an order for complete aerial photo coverage of easements in that county. Easements will be mapped in 1986.

The scraper ditch violation detected on November 16, 1983, on Glacier County easement 24X-1 was restored in June. The landowner

was very cooperative during the contacts and restoration process.

This scraper ditch, designed to drain one of the wetlands on Glacier County easement 24X-1 was restored by the landowner.
03/84 83-23-20 TT

G. WILDLIFE

Our information on wildlife populations within the district is very minimal. Due to limited staff and the size of our district, surveys are usually accomplished incidental to work projects.

1. Wildlife Diversity

By reducing grazing and converting monoculture croplands on our WPA's to dense nesting cover, we assume that diversity of species will increase.

The district contains at least three distinct habitat types. Most of the WPA's are located in the short grasslands of the high rolling plains. The Sweetgrass Hills along the Canadian border are high elevation glaciated prairie (Furnell WPA). The high mountain valley riverside habitat is represented by the McCormick WPA near Ovando. We have had little time to document species present.

2. Endangered and Threatened Species

Sightings of bald eagles, American peregrine falcons, prairie falcons, Richardson's merlins, and ferruginous hawks have been made in the district. Only the ferruginous hawk has been documented as nesting on our WPA's (Kingsbury Lake). The bald eagle nests near the McCormick WPA.

In June, 3 pair of trumpeter swans were observed on or adjacent to easement wetlands. One brood of 4 cygnets was observed near Bean Lake.

3. Waterfowl

A partial breeding pair count along with general observations formed the basis of estimating waterfowl production on our WPA's at 312 ducks and 24 Canada geese. This is the lowest production estimate since the initiation of production estimates in 1978.

4. Marsh and Water Birds

Due to the three year drought and lack of wetland habitat, use by these specie was extremely limited. The red-necked grebe nested on a portion of the McCormick WPA. Long-billed curlews were present on several WPA's.

5. Shorebirds, Gulls, Terns and Allied Species

Populations estimates and use are unknown for 1985, but were undoubtedly very minimal due to the lack of available habitat. Small colonies of Franklin gull and black tern have been known to nest on Schrammeck Lake and McCormick WPA's in past years.

6. Raptors

Raptors that are known to nest on several of the WPA's are the red-tailed hawk, short-eared owl, marsh hawk, and great horned owl. Other raptors seen regularly are the golden eagle, Swainson's hawk, Cooper's hawk, and the American kestrel. Additional raptors are mentioned in the Endangered and Threatened Species section.

8. Game Mammals

Deer numbers appear to have peaked out in the district in 1984. Mule deer and white-tail deer use continue to increase in response to our DNC plantings and are present on most WPA's. Adjacent landowners have reported elk present on the Furnell WPA during archery season. Hunting is allowed in accordance with state regulations on all of our WPA's except the Sands WPA, where hunting and trapping are not allowed as part of the deed stipulations.

10. Other Resident Wildlife

Huntable populations of Hungarian (gray) partridge, sharptail grouse and ring-necked pheasant are present on several of the WPA's. Pheasants have become established on the Danbrook WPA from bird releases in nearby Canada. Coyote, red fox, raccoon, badger, striped skunk, mink, weasel and rattlesnakes are also present.

H. PUBLIC USE

1. General

Monitoring public use on the district is very difficult. Most of the information we receive is reported directly to our office or is obtained by talking to adjacent landowners if we get the opportunity.

8. Hunting

Upland game, waterfowl and big game hunting is allowed on all the WPA's, except the Sands WPA. The degree of hunting pressure and success is unknown.

9. Fishing

Fishing by floating the Blackfoot River is locally popular in the Ovando Valley. The amount of public use on the Blackfoot River as it passes through the McCormick WPA is unknown.

10. Trapping

Trapping information is minimal. Trapping of muskrats, raccoon and coyote occurs on several WPA's.

17. Law Enforcement

Law enforcement activities are minimal. Trespass livestock, off-road vehicling and encroachment of farming operations are of concern.

Trespass cattle were observed on Schrammeck Lake WPA. The owner was notified and he removed the cattle. Hunters were blamed for leaving a gate open. The landowner adjacent to the Thompson (Big Sag) WPA, after previously being contacted for trespass cattle, rebuilt the north boundary fence of the WPA. This fence was in poor condition. The landowner had not previously grazed this area but lack of pasture made him decide to graze his grain field for pasture.

I. EQUIPMENT AND FACILITIES

1. New Construction

Construction projects are ranked in priority between the refuge and the

district and then we try to get as much done as possible.

Construction this year was limited to the development of the Sands WPA. A special recognition Sands WPA sign was purchased and a base constructed near the public parking area. The parking lot was fenced with walk-through access provided.

The erection of the Sands WPA sign and the fencing of the parking lot with walk-through access completes the initial development work for this WPA. Ten islands were constructed in the basin during the fall of 1984.

05/85 85-7-13 & 85-7-14 TT

2. Rehabilitation

The YCC crew assisted in removing an old corral, junk equipment, tires and lumber from the Sands WPA. The new DNC planting on the Sands WPA lies adjacent to the Havre Highway (US 89) and produced a cover of kochia and Russian thistle. To keep these plants from blowing loose in the fall and creating an unsightly appearance to passing motorists, the field was rotary mowed. Ten islands constructed in the fall of 1984 were seeded to a DNC mixture of grass and sweet clover.

J. OTHER ITEMS

1. Cooperative Programs

Assistance was provided to the Montana Department of Natural Resources and Conservation and the Department of Fish, Wildlife and Parks in monitoring and evaluating waterfowl use along the proposed locations of the WAPA power line crossing of the Marias River. At the same time waterfowl use of the FWS easements was also monitored south of Shelby.

District easement and WPA maps were sent to Arrowwood NWR to be incorporated into a waterfowl habitat study.

Assistance was provided to the Marias River Weed Action Committee for interagency support for noxious weed control in the Marias River watershed.

4. Credits

This report was written by Tornow, edited by Pearson, and typed by Benway.